МАКЕДОНСКА АКАДЕМИЈА НА НАУКИТЕ И УМЕТНОСТИТЕ

ИСТРАЖУВАЧКИ АКТИВНОСТИ НА МАНУ
ЗА СПРАВУВАЊЕ СО ПАНДЕМИЈАТА ОД КОВИД-19

Скопје, август 2020 година

Претседателството на МАНУ, на 512. седница, одржана на 13 април 2020 година, упати соопштение до јавноста за научен осврт и анализа на состојбите во врска со пандемијата од ковид-19, во согласност со општествената одговорност на МАНУ, а заради обезбедување соодветен научен придонес во институционалните напори за справување со оваа пандемија. Зборникот на трудови што го имате пред вас го сочинуваат 16 труда од членови и соработници на МАНУ и еден додаток – изјава за човековите права кои се сметаат за релевантни во пандемијата од ковид-19 поднесена од Комитетот за биоетика на УНЕСКО. Во зборникот се поместени следниве трудови:

- Предизвици на општеството, економијата и животната средина по пандемијата на заразата од ковид-19, Љупчо Коцарев
- Економската криза од covid-19 и нејзините импликации врз македонската економија, Таки Фити
- Монетарна политика и осигурување на стабилноста на македонскиот финансиски систем, Таки Фити
- Правни аспекти на вонредната состојба, Владо Камбовски, Гордана Лажетиќ, Ана Павловска-Данева, Елена Мујоска Трпевска, Константин Битраков
- Паноптичка визија на светот (Дали вонредната состојба може да стане редовна?), Катица Ќулавкова
- За невропсихијатриските манифестации кај инфекцијата од ковид-19, Нада Поп-Јорданова
- Фискалните политики и фискалниот простор во време на глобалната пандемија со посебен осврт врз Република Северна Македонија, Абдулменаф Бејети
- Загрозеноста на светот како книжевна тема, Митко Маџунков
- Бизнис-стратегии на фирмите во услови на ковид-19, Изет Зеќири
- Implementation of e-learning and ICT in the educational process of UGD in the situation of Covid-19 emergency Zoran Zdravev, Blazo Boev, Misko Djidrov
- „Паметниот“ текстил во борба против пандемиите, Александра Иваноска-Дациќ
- Проблематична употреба на интернетот во проблематично време на пандемија, Билјана Ѓонеска
- Прелиминарна нумеричка анализа на алгоритам (протокол) за контролирано стекнување со колективен имунитет во услови на епидемија во комплексни мрежи, Игор Томовски
- Истражување за ковид-19: процена на состојбите и перцепциите на населението во северна Македонија за пандемијата предизвикана од новиот корона-вирус, Марица Антовска-Митев, Татјана Дранговска
- Краток преглед на методите од биоинформатика и машинско учење во борбата против пандемијата од заразата од ковид-19, Маја Николова, Љупчо Коцарев
- Сентиментална анализа на Твитер податоци за време на ковид-19 во Македонија во споредна со светот, Евгенија Крајчевска, Александра Дединец, Љупчо Коцарев

Проширена и дополнета верзија на зборникот се очекува да излезе во печатена форма до крајот на 2020 година.

Implementation of e-learning and ICT in the educational process of UGD in the situation of Covid-19 emergency

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Abstract

E-learning has become the key to a profound revolution in learning. This is because E-learning can offer a flexible and most effective learning approach. Goce Delchev University - Shtip is a leading institution in the implementation of new technologies in education in Macedonia. To understand the current state of Macedonian universities, this paper highlights a wide range of E-learning practices and activities that took and are taking place today at the Goce Delchev University in Shtip, amid the global crisis caused by Covid-19. All activities are implemented through the e-learning Department, which directs, supports and coordinates these activities. The key benefits of a successful integration of e-learning as part of the university's broader learning practices have been explored, and a survey has been conducted to analyze students' experience of online teaching during the Covid-19 crisis. We realized E-learning opportunities appear and the question arises as to how universities in Macedonia can benefit from a joint action.

Keywords: e-Learning, Online teaching, Covid-19

1. Introduction

The presence of information and communication technology in education has brought about significant changes in the learning and teaching process. E-learning becomes important because of the obvious benefits it offers to learning anywhere and anytime, according to the needs of the learner. Today, most of the efforts in the field of e-learning are focused on the educational use of ICT at all levels of the educational system.

In the last two or three decades, a constant imperative for teachers has been to introduce the use of ICT into the educational process. To this end, various projects are being implemented at all levels of education to integrate ICT into teaching. In the Republic of Macedonia, this process has been especially emphasized in the last ten to fifteen years, through the implementation of several projects of national interest. These projects were funded by USAID, the European Council and the Ministry of Education and Science.

Until 2007, some of these projects were implemented through the Faculty of Pedagogy in Stip, and from 2007 onwards, through the University “Goce Delchev” - Shtip (University “Goce Delchev” - UGD was established in 2007 and the Faculty of Pedagogy joined the University from the day of its establishment). In the second half of 2007, with the establishment of the Goce Delchev University (UGD), a policy was established that it would be organized with a high degree of ICT use in all segments of operations, both administration and teaching. Thus, by the end of 2008, computers were provided for each UGD employee, new classrooms and computer labs with interactive whiteboards were provided, and a modern network connecting optically-connected buildings and campuses was provided. In September 2008, an E-learning center was established, and a Moodle learning management system was implemented (Zdravev, Dimov, & Krsteva, 2011).

Two projects are important for the implementation of UGD e-learning: the first was "Integrating e-learning into the curriculum for teachers", 2006-2009, the TEMPUS project which was supported by the European Commission, and the second project "Implementation of LMS in teaching" , 2009-2011, which was organized as part of the University's ICT implementation activities, was partly supported by the Fulbright Foundation and partly by the UGD.

As a result of these projects, in September 2008 the e-learning center started operating in order to introduce modern forms of university learning, new technologies (interactive whiteboards, graphics boards, multimedia software and hardware, audio-visual equipment), as well as training for teachers and students from universities and schools in Macedonia and abroad. The realization of these projects through the e-learning center of the University "Goce Delchev" made UGD a leading institution in our region in the implementation of new technologies in education (Zdravev, Dimov, & Krsteva, 2011).

The third important moment for the adoption of e-learning technologies at UGD is the decision to make elective university courses realized mainly through the e-learning platform, and the exams to be electronic, in a controlled environment. For this purpose, most of the teaching staff in the period 2014-2015 participated in the training to create electronic tests.

In March 2020, a pandemic of the COVID-19 virus began, opening a global crisis in all areas, including education. The global COVID-19 pandemic - the corona virus in parallel with the global health crisis - has created a global crisis in education, with 82% of students in the world no longer in traditional education programs, and UNESCO recommends online learning (Vota, 2020).

The undoubted effect of the pandemic will be the rapid and progressive virtualization of economic and social life. After the end of the pandemic, the transfer of the entire sector of economy and administration of the network may slow down, but changes in habits, reduced operating costs and the created infrastructure will strengthen virtualization (Sułkowski, 2020).

The paper is divided into five parts. The first part is the introduction, and the second part of the paper presents the situation with the use of ICT technologies for e-learning, online teaching and examinatios in the context of the global crisis and pandemic Covid-19. The third part shows the current technologies used for online teaching and learning and singles out the technologies that are most used worldwide.

The fourth part is divided into three segments: first an analysis of the state of e-learning on UGD, before and during the pandemic. The second segment shows the process of online learning and the methodology for using selected e-learning technologies and provides statistics on their use. Finally, the survey conducted at UGD was analyzed, which shows the experience of students from the realization of online teaching in the period March-June 2020 in the state of Covid-19.

Finally, the fifth section concludes the paper, with the experience of using ICT and online e-learning at UGD, with considerations and guidelines for further action.

2. E-learning in the context of the global crisis 2020 - the pandemic Covid -19

Like many other industries, the education sector is heavily influenced by the COVID-19 pandemic. On March 30, 2020, ITU News (ITU is the United Nations' specialized agency for information and communication technology) announced that 165 countries had closed schools nationwide, affecting

more than 1.5 billion children and youth (ITU News, 2020), according to UNESCO's sources - The United Nations Scientific and Cultural Organization.

There is also great uncertainty about when schools will open. Fortunately, these days, there are many free (or low-cost), easy-to-use, digital communication tools that provide a significant number of distance learning solutions.

Almost all major global organizations have offered their own strategies for overcoming the crisis and offered a set of tools and digital content. Thus, according to the European Commission, such tools for e-learning and online learning can serve a variety of educational purposes (EC, 2020):

- connecting teachers and students with each other when they are in separate locations
- access to information and environments that are not usually available in every home or institution
- support the continuous professional development of teachers in a flexible way

In addition, EC, UNESCO and other organizations offer free digital content to support education.

For now, teachers, students and families are still struggling with the immediate task of conducting online classes and distance learning within their homes. Most of them do it for the first time.

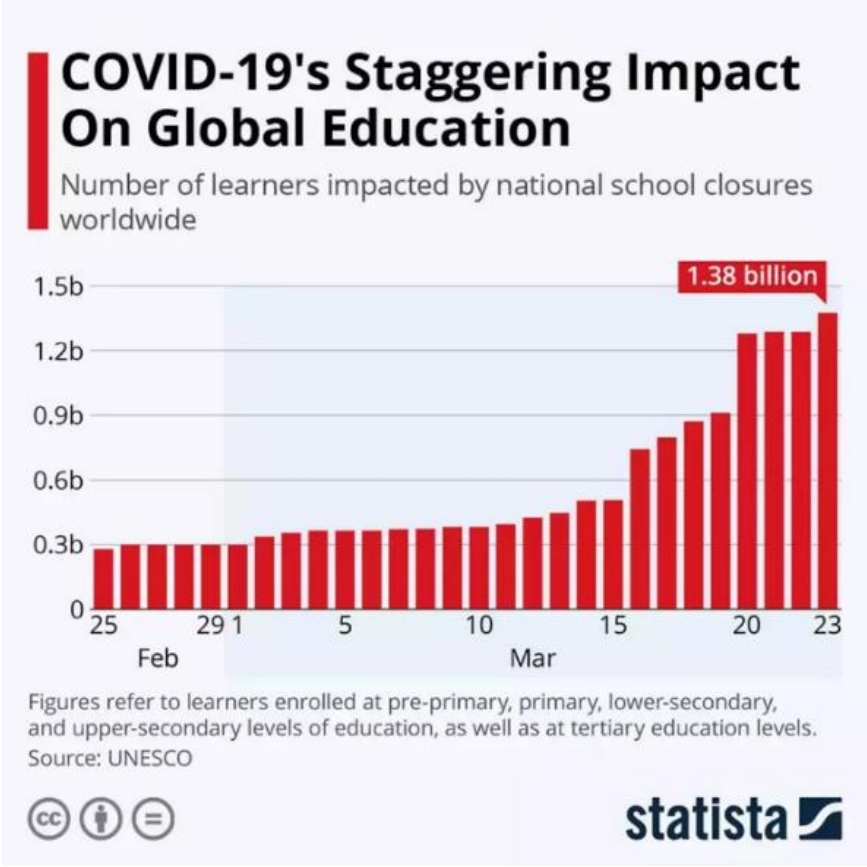

Figure 1 - Covid-19 Impact on Global Education - Source UNESCO

But, with this sudden change in learning in many parts of the world, the question arises as to whether the adoption of online learning will continue to exist in the post-pandemic and how such a change

would affect the global education market. According to (Lalani & Li, 2020) even before COVID-19, there was already a great growth and adoption in education technology, with global investment in educational technology reaching $ 18.66 billion in 2019, and the overall online education market predicts to reach $ 350 billion by 2025. Whether it is language applications, virtual learning, video conferencing tools, or Internet learning software, there is a significant increase in usage from COVID-19. This is illustrated in the chart provided by UNESCO, which refers to lower levels of education and shows 5 times more the number of students covered by online teaching in a very short period from February to April 2020 shown in Figure 1.

The second question that arises is how effective is e-learning or is it more effective than traditional e-learning? This opens up space for further serious research, but some facts in favor of e-learning remain: compared to a traditional classroom setting, students can learn at their own pace, go back and re-read, skip or speed through their chosen concepts. Finally, there are some values of traditional distance learning: self-discipline improves, motivation increases, ignoring various social, cultural and economic differences, and so on (Zdravev & Grceva, 2004). But, some are trying to exploit the situation with insufficient research on this issue and are placing figures from alleged research in non-existent institutes for marketing purposes. (AdrianSnook, 2019).

The pandemic first broke out in China, where they launched the School's Out, But Class's On project, allowing 270 million students in China to study online (Zhou, Li, Wu, & Zhou, 2020). Thus, many schools across the country (China) have begun to actively use "cloud" technology for self-education via the Internet, learning by searching the Internet, learning via TV video and other methods of teaching over the Internet. Here are the problems that arise in the process of conducting online teaching. For example, in online teaching, some teachers only copy lectures from classical classroom instruction to online teaching courses, ignoring subjective guidelines, have no teacher-student interaction, and receive poor teaching results. At the same time, some students lack self-control and the ability to learn on their own, there is insufficient control by teachers, or even poor or no parental control. This has made online learning a form, and the autonomous effect of learning has not been fulfilled. This question raises new demands and new learning goals on online learning and using ICT in education (Zhou, Li, Wu, & Zhou, 2020) :

- How to better integrate technology and education;
- How to motivate and make students learn independently in online teaching, how to make teaching more effective, and how to teach online models to be more understandable;
- How to bring home and school education closer together and connect through online learning.

3. Current technologies for online learning in 2020

In the last ten years we have an influx of a huge number of technological solutions, tools and platforms to support online learning and operation, which work with communication, data and instructions exchange in real-time (synchronized) or with communication and data and instructions exchange with time lag (asynchronous) (Hrastinski, 2008).

The OECD publication (Reimers, Schleicher, Saavedra, & Tuominen, 2020) identified:

- 72 resources in a group of digital content called Curriculum Resources, which contain lessons, videos, interactive learning modules and any other resources that directly support students in acquiring knowledge and skills
- 21 resources for professional development, containing resources that can support teachers or parents in supporting learners, guiding them to content, developing their skills to teach remotely, or, more generally, enhancing their capacity to support learners to learning more independently at home, rather than at school
- 20 tools that can help manage teaching and learning, such as communication tools, learning management systems or other tools that teachers, parents or students can use to create or access educational content

Current real-time online communication and collaboration tools are video conferencing services such as TEAMS and ZOOM, which are market leaders in collaboration tools. According to (Mendoza, 2020), the use of TEAMS from March 2020 to June 2020 increased by almost 900%, and the ZOOM by almost 700%, as shown in Figure 2:

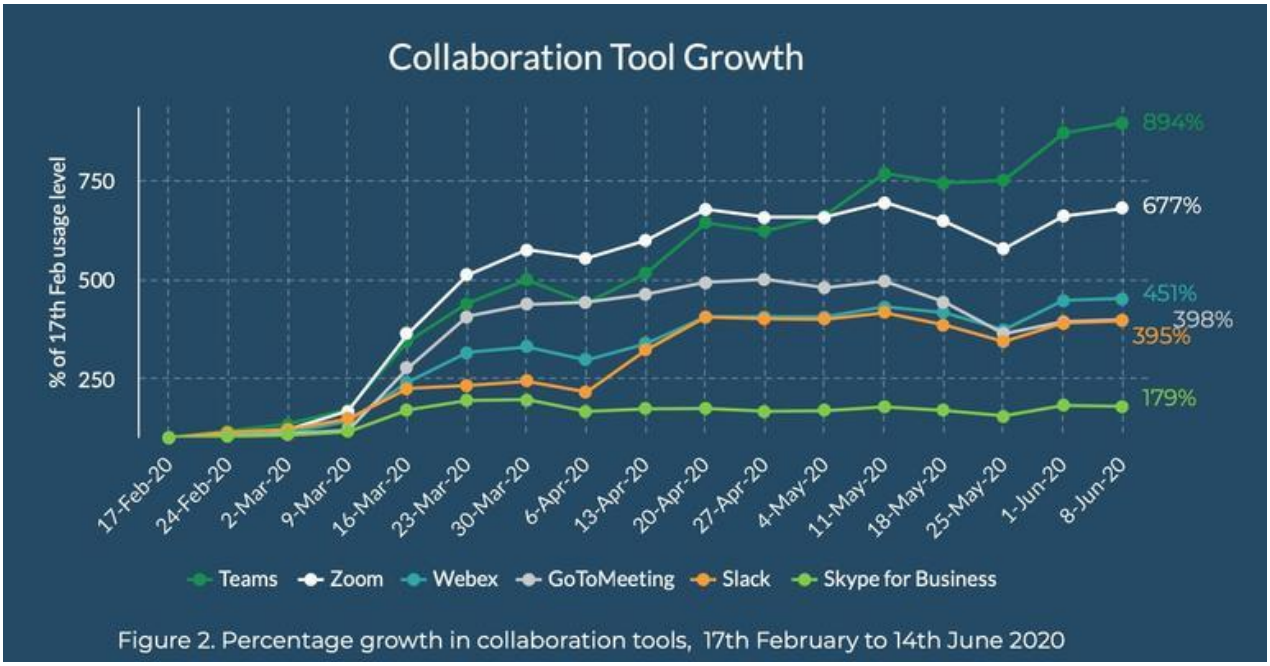

Figure 2 - Collaboration Tool Growth, Source TechRepublic

Another tool we need to pay attention to is the e-learning management system, and the undisputed leader in this area is the MOODLE system. According to official MOODLE statistics *(Moodle HQ, 2020)*, the system operates in 244 countries, with a total of 159,000 installations and 211,000,000 users. The largest users of the MOODLE system by country are given in Table 1:

Table 1 - Top 10 from 244 countries by Moodle registrations, Source Moodle.org

Country	Registered sites
United States	12,002
Spain	11,575
India	11,529
Mexico	9,469
Germany	7,637
Brazil	6,791
France	5,573
Russian Federation	5,528
Colombia	4,675
Indonesia	4,654

In Macedonia, 85 installations have been registered, the largest of which is the UGD E-Learning (MOODLE) system, for which we will provide further data.

4. The state of e-learning at UGD, before and during the pandemic

The 2020 Corona-19 pandemic found UGD able to easily deal with the challenge of closing classic classrooms and teaching remotely or online. At UGD, we have technologies for conducting online classes and we have enough technique and skills for its realization. It only took a few encouraging impulses to get started with online teaching, including assessments.

The previously successfully implemented project activities (Zdravev, Dimov, & Krsteva, 2011) were crucial for the successful start of complete online teaching at UGD:

- TEMPUS project “Integrating E-learning into the curriculum for teachers” 2006-2009, through which the training of the teaching staff at UGD for e-learning began and which resulted in complete equipping and start of work of the Center for e-learning and installation of the first MOODLE system at UGD.
- The project supported by the Fulbright Foundation 2009-2011 for the training of 30 teachers on the use of learning management systems, in this case MOODLE
- Projects and activities for training each teacher for using the ICT resources at UGD and especially the system MOODLE 2011-2014. After this training, each new UGD employee had to undergo the same training to be able to start teaching at UGD.
- Beginning of the realization of the elective university subjects with e-learning, hybrid methodology and electronic taking of the exams in a special classroom for e-testing. This was a necessary approach because more than 500 students per teacher enrolled certain elective university subjects. To achieve this, special trainings were conducted for each teacher for the realization of e-learning and electronic testing (2015).

The impetus needed during the pandemic first came from the Ministry of Education and Science when, for higher education institutions, the law was amended to allow distance learning and online exams, providing that higher education institutions could apply appropriate technical solutions to ensure student identification and to monitor students' behavior and work during exams.

The second impulse was given by UGD, with a series of activities and decisions, when intensive training was begun to start online teaching, colloquia and exams. Two trainings were conducted, which were recorded as video material and were available to every UGD employee. An important decision made at that time was that the teaching staff has the freedom to use technologies according to their own convictions and needs and given that the subjects taught are not the same and that there are specifics for each individual subject. This was significant because the teaching staff was motivated to apply the most appropriate technology and not be limited to the imposed hybrid solutions.

4.1. Technology and methodology used during the Covid-19 pandemic

In teaching and maintaining online colloquia and exams, every teacher had the freedom to use the technology that suits him/her best. The most dominant technologies used were the Microsoft TEAMS online collaboration system and the MOODLE learning management system.

Professors and students adopted TEAMS in the very first month. At the beginning, there was less use, but in the next period, the use increased several times. This is shown in Table 2, for the initial period from March 26, 2020 to April 24, 2020 for a total of 29 days.

Table 2 - TEAMS activity March-April 2020 at UGD

26 Mar-24 Apr (29 Days)	Students		Teachers		**Total**
Active	3821		353		**4174**
	Total	Average (per student)	Total	Average (per teacher)	**Total**
Meetings Organized	39	0.01	1,502	4.25	**1,541**
Meetings Participated (incl. GroupCalls)	7,644	2.00	3,766	10.67	**11,410**
Audio time (minutes)	2,446,184	640.19	179,048	507.22	**2,625,232**
Video time (minutes)	1,005,583	263.17	121,425	343.98	**1,127,008**
ScreenShare time (minutes)	241,311	63.15	13,024	36.90	**254,335**

Table 3 shows the period from March 6, 2020 to June 3, 2020, a total of 89 days:

Table 3 - TEAMS activity March-June 2020 at UGD

6 Mar – 3 Jun (89 Days)	Students		Teachers		**Total**
Active	4416		367		**4783**
	Total	Average (per student)	Total	Average (per teacher)	**Total**
Meetings Organized	361	0.08	10,670	29.07	**11,031**

Meetings Participated (incl. GroupCalls)	103,763	23.50	9,897	26.97	**113,660**
Audio time (minutes)	6,079,242	1,376.64	510,051	1,389.78	**6,589,293**
Video time (minutes)	3,153,207	714.04	363,216	989.69	**3,516,423**
ScreenShare time (minutes)	614,978	139.26	42,376	115.47	**657,354**

Here we must mention that the data on the use of TEAMS by the professors includes mutual meetings of professors, not only teaching and work with students.

The current state of UGD's Moodle use is as follows:

- Number of courses (1550)
- Number of users (8686)
- Number of questions (49889) – for online tests
- Number of resources (15769)
- Average number of participants (68,57)
- Number of users with registered mobile devices (735)
- Number of active users with registered mobile devices which are receiving notifications (220)

Between March 8, 2020 and June 21, 2020, the number of Moodle activities ranges from 25,000 hits per week in March 2020 to over 350,000 hits at the end of May 2020, which is 14 times the increase in online activity and is shown in Figure 3. The decrease in activity at the end of April and the beginning of May is due to the holidays, and at the beginning of June due to the end of the semester.

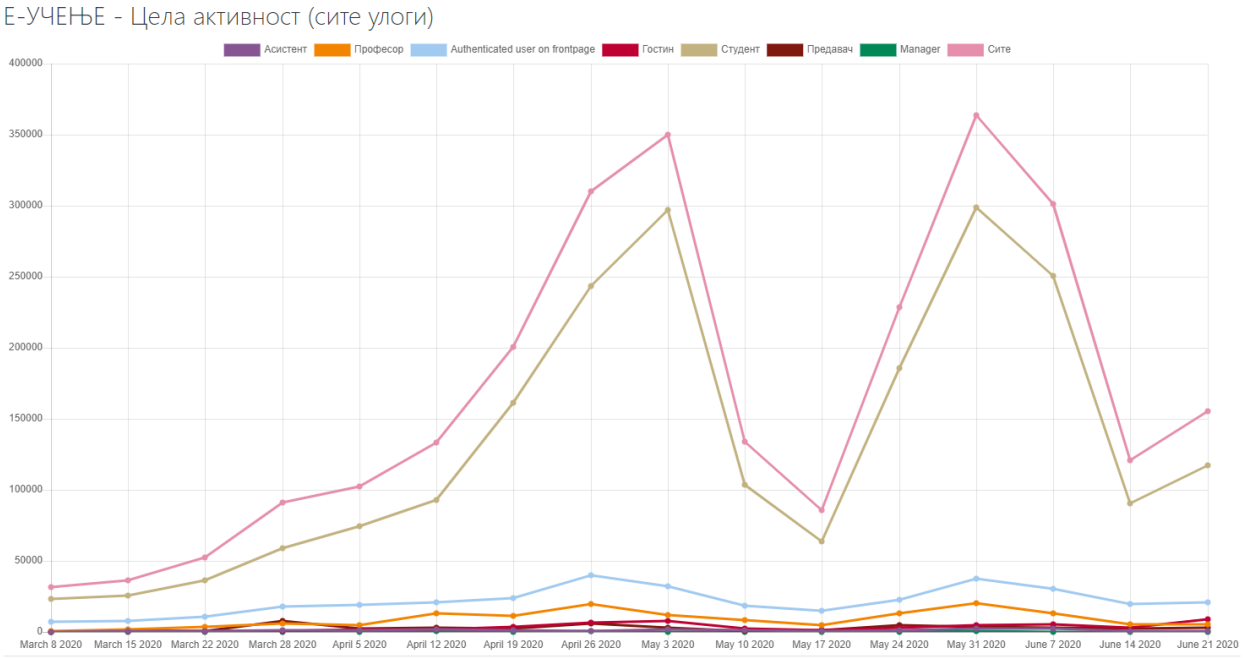

Figure 3 - Moodle activity period March - May 2020

Figure 4 shows the monthly statistics for the last two years where we can see days when the use of Moodle on a monthly basis increased 3 times in time in the Covid-19 crisis. in March-April-May 2020 compared to the same period last year - March-April-May 2019. In April 2020, a record Moodle access of over 1,000,000 hits was reached.

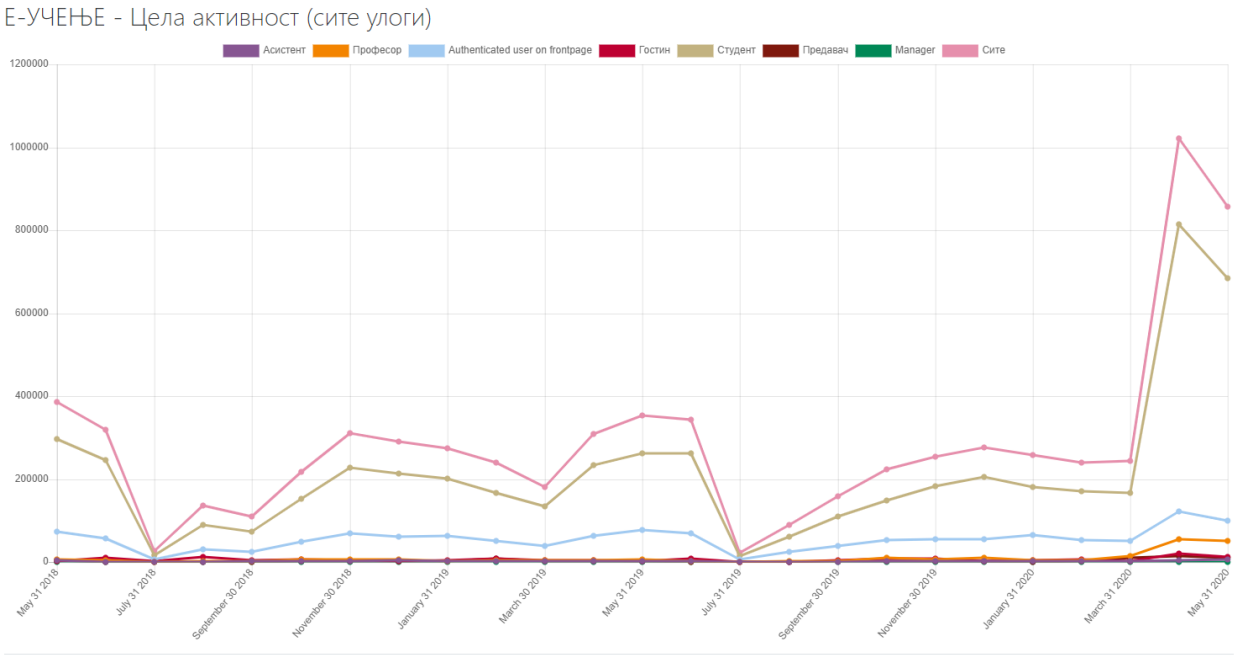

Figure 4 - Moodle activity period May 2018 - May 2020

The teaching was carried out in combination, using TEAMS and sharing digital content through MOODLE. Through TEAMS, the screen sharing option was used in teaching. Standard channels, e-mails and messages via the MOODLE system were retained for mutual asynchronous communication.

Apart from MOODLE and TEAMS, teachers were free to use other technologies according to their needs, but this is a very small part and we will not mention it here.

The realization of exams and colloquia also took place through using different combinations:

- Moodle and TEAMS, online testing, where testing was conducted through Moodle, and students were controlled via TEAMS from the computer.
- Moodle and TEAMS, online testing, where testing took place via Moodle, and students were controlled via TEAMS with two student logs, the student's computer and the student's phone, with the computer's camera pointing only at the student, and the camera from the phone to the student's desk.
- Written exam with control via TEAMS and sending the results with a picture via mobile phone, and the control is performed in the same way as in the first two cases.
- Oral exam through TEAMS, with direct conversation professor-student by having included more students at the same time and given time for students to make a concept for answering.

According to the records from the Department of Electronic Learning, for the period April-May-June 2020, a total of 223 electronic tests (colloquia) were conducted, which did not include the minimum number of tests performed without the support of the Department of Electronic Learning. The details are given in Table 4:

Table 4 - E-testings on UGD, period March-June 2020

Period	Number of e-tests	Attempts (e-tests)	Support by email
03.04-24.04	49	3119	193
25.04-20.05	66	4512	160
21.05-22.06	108	8391	307
Total	*223*	*16022*	*660*

During this period, in informal communication with teachers, it has been concluded that at this moment all teachers have a lack of digital teaching content (presentations, visual videos, video lectures, texts, animations, etc.) and that they are uncertain about the methodology to be applied and followed, to which more attention should be paid in the upcoming period through trainings or joint discussions with the presentation of personal results. The process of creating digital content is lengthy and laborious, and this probably requires systematic support at university or state level. Digital content is very important for improving the experience and satisfaction of students in online teaching.

4.3. Student Opinion Survey on Online Teaching

In the last week of May, from 25 to 31 May 2020, for the needs of UGD, a survey was conducted with the participation of 1237 students from all faculties at UGD (Dzidrov, 2020).

Of the 1,237 surveyed students, only 19 (2%) stated that they did not have access to a computer or other IT device, and 83 (7%) students stated that they did not have easy access to the Internet. The majority of students (67%) said that they believe that online teaching should continue after the emergency measures, as a supplement to regular teaching.

On other survey questions, students' opinions are given in Table 5:

Table 5 - Survey: students experience on online teaching and learning

	Agree	Partly agree	Do not agree
IT opportunities and capabilities			
I can easily attend the lectures	63%	29%	8%
The tools provided by UGD meet the needs	55%	36%	9%
I use UGD services without any problems	65%	27%	8%

I can easily find technical help for online teaching and lectures	52%	34%	14%
University activities			
The introduction of online lectures was timely	54%	29%	17%
Online exams were well organized	52%	29%	19%
I am pleased with the support I received from UGD during the break	54%	29%	17%
How much of the teaching is done online			
Online lectures	46%	43%	11%
Online exercises	31%	38%	31%
Online lectures			
I have materials available for online learning	64%	26%	10%
The quality of online lectures is high	41%	42%	17%
Professors are available for information	56%	31%	13%
Online lectures are very useful	49%	33%	18%
Online exams and colloquia			
I was able to demonstrate all my knowledge through online exams or colloquia	50%	29%	21%
The colloquia were realized without any problems	54%	26%	20%
The tests were conducted without any problems	56%	24%	20%
The assessment was fair and just	49%	30%	21%
Online exams or colloquia are helpful	52%	27%	21%

According to the answers, only a small percentage of students, less than 10%, have difficulty following online lectures, using IT tools and using UGD's online services, while about 14% have difficulty getting technical help. Probably in the next period, we should pay attention to these students and organize special technical assistance courses.

More than 50% of students are satisfied with the timely introduction and organization of online lectures, as well as the support that UGD has provided during the break. Here we should also mention those about 30% of the students who declared themselves neutral on these issues. These responses are a signal that UGD must work to improve online lectures, due to the high percentage of students, almost 20%, who had a negative opinion about the timely introduction, organization and support of online lectures.

The students also commented positively on the available online materials (64%) and the availability of professors (56%), but said that the quality of the lectures should be increased: 41% were satisfied and 42% had no position on the issue.

5. Conclusion

The process of implementing ICT in everyday work in teaching is not easy, especially in times of crisis and emergency measures. It takes a lot of effort, dedication and perseverance.

During the establishment of UGD in 2007, before the general process of implementing e-learning and ICT, the main problems were identified in the lack of equipment and lack of skills to use the equipment. However, another issue was initially overlooked: the human factor - motivation and readiness to use ICT. This was frustrating - teachers who were leaders with their support for computerization, when they started using computers, avoided training and maintained low ICT skills. Unfortunately, this is a fact that was discussed with colleagues (in 2010) between the ages of 30 and 40. A solution to this has been found in several "unpopular" measures: compulsory training for everyone by controlling attendance and checking acquired skills, instructions for mandatory use of ICT, and regulating the entire process with regulations. All of this, nowadays (2020), has resulted in a willingness to use e-learning and online teaching in emergencies, in times of crisis.

The key benefits of this implementation are:

- Increased flexibility and ability to respond to the development of current needs by quickly utilizing a new and organized approach to the learning process in front of distributed participants. To improve and increase reliability, it is necessary to establish a design and develop standards for e-learning at the university level to ensure consistency and portability of knowledge and skills.
- Increased efficiency and flexibility that allows students to engage in the learning process at any time and from any place.

From all the above, in our success story, we have found that the key to success are:

- Access and improved skills to use advanced ICT equipment, services and online technologies and learning resources
- Continuous training to upgrade skills for using ICT equipment, services, technologies and resources
- Organizing special centers or departments that will have the task to monitor compliance with ICT (security, maintenance, interruption, use) and provide continuous training to users
- Searching for a way to motivate users through rewards, orders, rulebooks, decrees, etc.
- Organizing a digital content repository and learning materials that can be reused .

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